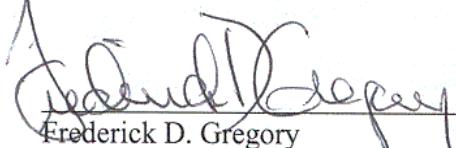




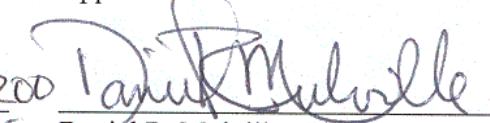
Functional Leadership Plan

Safety and Mission Assurance

Submitted:


Frederick D. Gregory
Associate Administrator for
Safety and Mission Assurance

Approved:

Date 12 APR 00  Date 5/8/2000
Daniel R. Mulville, Ph.D.
Associate Deputy Administrator

DOCUMENT HISTORY LOG

Status (Draft/ Baseline/ Revision/ Canceled)	Document Revision	Effective Date	Description
Baseline		April 12, 2000	

Introduction

NPD 1000.1, The NASA Strategic Plan, clearly establishes safety as one of NASA's core values. Through its Strategic Plan, NASA has articulated its commitment to establishing the Agency as the Nation's leader in preventing mishaps that impact the safety or health of the public, NASA astronauts and pilots, the NASA and contractor workforce, and the national resources under its charge. NASA's management team is ensuring that safety permeates everything the Agency does and is fostering an environment that will not tolerate the occurrence of mishaps. By focusing on the safety of missions, NASA will also improve quality and decrease schedule and cost.

The Office of Safety and Mission Assurance (OSMA)¹ is the focal point and functional leader for the safety, reliability, maintainability, and quality assurance (SRM&QA) of all NASA programs. The principal responsibilities of the OSMA may be found in Section 416 of NHB 1101.3, The NASA Organization. This Functional Leadership Plan describes the approach the OSMA and the SMA organization at each of NASA's Centers is taking to fulfill its role within NASA. The Center SMA organizations work closely with the OSMA in pursuing the strategies and objectives of this functional plan. The plan is presented in four parts.

Part 1: Mission, Goals, and Strategies (Objectives)

Part 2: Organization and Interfaces

Part 3: Metrics

Part 4: Major Functional Initiatives

A. Agency Safety Program Implementation (also known as the Agency Safety Initiative)

B. ISO 9000

References

NPD 1000.1A, NASA Strategic Plan

NPD 8700.1, NASA Policy for Safety and Mission Success

NHB 1101.3, The NASA Organization

Safety and Mission Assurance Strategic Plan, dated March 23, 1998 (superceded by this document)

¹ The term Safety and Mission Assurance (SMA) when used herein refers to the Office of Safety and Mission Assurance and the associated SMA offices at each Center. The term Safety, Reliability, Maintainability, and Quality Assurance (SRM&QA) refers to the functional disciplines of assuring safety and mission success for which the distributed SMA organization provides leadership.

Part 1: Mission, Goals, and Strategies (Objectives)

Safety and Mission Assurance Mission

To assure the safety and enhance the success of all NASA activities.

Goals

- *Early integration and life-cycle implementation of safety, reliability, maintainability, and quality assurance (SRM&QA) into NASA's programs and operations.*
- *Thorough and expeditious independent assessments (IA's) of program/project safety, reliability, maintainability, and quality.*
- *Innovation and rapid transfer of SRM&QA technologies, processes, and techniques to help program/project managers improve the likelihood of mission success while reducing overall costs.*
- *Development and application of risk management methodologies to provide relevant, practical, and timely contributions to NASA's management of risk.*
- *Deployment of an Agencywide Safety and Mission Assurance (SMA) Team that is highly motivated, trained, and properly equipped.*

Strategies (Objectives)

- *Independently assess NASA programs, projects, and facilities by:*
 - Reviewing and evaluating the risk management processes of developmental and operational programs/projects at milestone reviews and in support of Program Management Council (PMC) meetings at both Headquarters and Centers.
 - Expanding the SMA Pre-launch Assessment Review (PAR) process across the Human Exploration and Development of Space (HEDS) Enterprise to include International Space Station (ISS) launch, assembly, and on-orbit operations.
 - Independently reviewing and evaluating the SRM&QA processes within the Strategic Enterprises.
 - Reviewing Center SMA organizations and evaluating the robustness of their processes.
 - Developing and implementing the Safety and Mission Assurance Readiness Task (SMART), a *PAR-like* process to assure readiness of expendable launch vehicles and science and payload missions using expendable launch vehicles.
- *Effectively communicate risk issues by:*
 - Improving channels for risk communication between SMA and program management.
 - Establishing a Risk Based Acquisition Management (RBAM) process to inject the principles and practices of risk management into the acquisition cycle.

- Establishing SMA personnel as highly respected risk management consultants to program and project management.
 - Maintaining the direct access of Center SMA Directors to their Center Directors.
 - Maintaining effective communications between the Associate Administrator for Safety and Mission Assurance and Center SMA Directors.
 - Maintaining independent access of Center SMA Directors to the Associate Administrator for Safety and Mission Assurance, and subsequent access to the Administrator.
 - Maintaining an anonymous safety reporting process (the NASA Safety Reporting System) while promoting cultural changes that will reduce the need for anonymous reporting in the future.
-
- *Assist the Enterprises in the effective design, development, production, and operation of aerospace systems by:*
 - Establishing policies that define the minimum set of SMA requirements applicable to Centers and programs/projects.
 - More effectively executing the SRM&QA disciplines in the systems engineering process (which includes treatment of both hardware and software in an integrated manner).
 - Promoting the application of innovative, tailored, results-oriented SRM&QA approaches versus rigid standards.
 - Establishing methods for formal risk assessment for use by program/project managers.
 - Partnering with the Chief Engineer to develop criteria for governing risk acceptance by decision makers presiding over Program Management Councils conducted at critical life-cycle milestones.
 - Assisting program management in benchmarking and applying lessons learned and best practices to programs and projects.
 - Ensuring the proper documentation of new lessons learned and best practices.
 - Implementing advanced quality concepts and concurrent engineering techniques to effectively integrate safety, reliability, maintainability, and quality into all phases of a product's life cycle.
 - Promoting sustained excellence in technical performance, customer satisfaction, and quality and productivity by supporting programs such as the George M. Low Award and the annual NASA/Contractors' Conference on Continual Improvement and Reinvention.
-
- *Identify and sponsor the development of new and innovative SRM&QA technologies and transfer those technologies by:*
 - Working with NASA Strategic Enterprises for the acceptance or more effective use of SRM&QA technologies, tools, and techniques.
 - Working with other government agencies, academia, and the commercial sector for the exchange of SRM&QA technologies, tools, and techniques.

- *Improve program/contractor problem reporting and data integrity (accuracy, completeness, and security) by:*
 - Analyzing and streamlining the problem reporting process.
 - Establishing criteria and methods for effective and efficient problem documentation, analysis, and resolution by program management.
 - Enhancing the capability for problem reporting to support quantitative risk assessment.

- *Enhance the SRM&QA skills, knowledge, and abilities of NASA personnel by:*
 - Developing, institutionalizing, and continually improving a comprehensive training and career development program for NASA SMA professionals. (The Professional Development Initiative (PDI), including the use of the web training capabilities of the Site for On-line Learning and Resources (SOLAR), are intended to facilitate this strategy.)
 - Providing for training in safety, reliability, maintainability, and quality disciplines and associated tools to program, project, and functional management.
 - Assisting program, project, and functional management personnel in the correct application of safety, reliability, maintainability, and quality tools.
 - Committing SMA organizational resources for SMA skills training and career development.

- *Implement an integrated SMA management process (i.e., Enterprise Agreements, self-assessments, Annual Operating Agreement (AOA's), Process Verification (PV), and metrics) for:*
 - Managing, assessing, and improving Agencywide SMA processes.
 - Selectively assessing program/contractor processes as they relate to safety, reliability, maintainability, and quality for hardware, software, and people.

Part 2: Organization and Interfaces

OSMA Organization

OSMA has functional responsibility for the proper application of SRM&QA processes for all NASA programs. OSMA reports directly to the NASA Administrator. By design, this office is independent of the NASA program offices, thus able to provide non-advocate assessments of safety and effectiveness of NASA programs.

OSMA has a flat organizational structure consisting of a front office and four operating elements. The operating elements are the Safety and Risk Management Division (QS), the Enterprise Safety and Mission Assurance Division (QE), the Human Exploration and Development of Space (HEDS) Independent Assurance Office, and the Executive Director, Aerospace Safety Advisory Panel (Q-1). The NASA Center SMA offices functionally report (are “dotted-lined”) to the OSMA for leadership and guidance in the technical SRM&QA areas.

- The Safety and Risk Management Division focuses primarily on defining and documenting the requirements and direction necessary to assure safety and mission success throughout the Agency. In addition, this Division is responsible for the oversight and independent assessment and support of operational/institutional/aviation safety.
- The Enterprise Safety and Mission Assurance Division provides the primary interface with the customers of the OSMA, the NASA Enterprises and the Center SMA organizations. This Division assists its customers in understanding and implementing SMA policy and guidelines and monitors compliance.
- The HEDS Independent Assurance Office provides senior NASA management with timely, objective, non-advocacy assessments of program technical integrity and status of the HEDS Enterprise, identifies deficiencies, and makes recommendations for correction.
- The Executive Director, Aerospace Safety Advisory Panel, provides staff support for the Aerospace Safety Advisory Panel. As an independent safety review body, the mission of the Aerospace Safety Advisory Panel is to advise the NASA Administrator and Congress on all safety-related issues concerning NASA's aeronautics, robotic, and human operated space flight programs.
- In support of the Center Director, Center SMA offices use SMA tools and techniques to provide assistance, guidance, and assessment of Center-based programs and operations.

The OSMA organization chart is shown in figure 2-1.

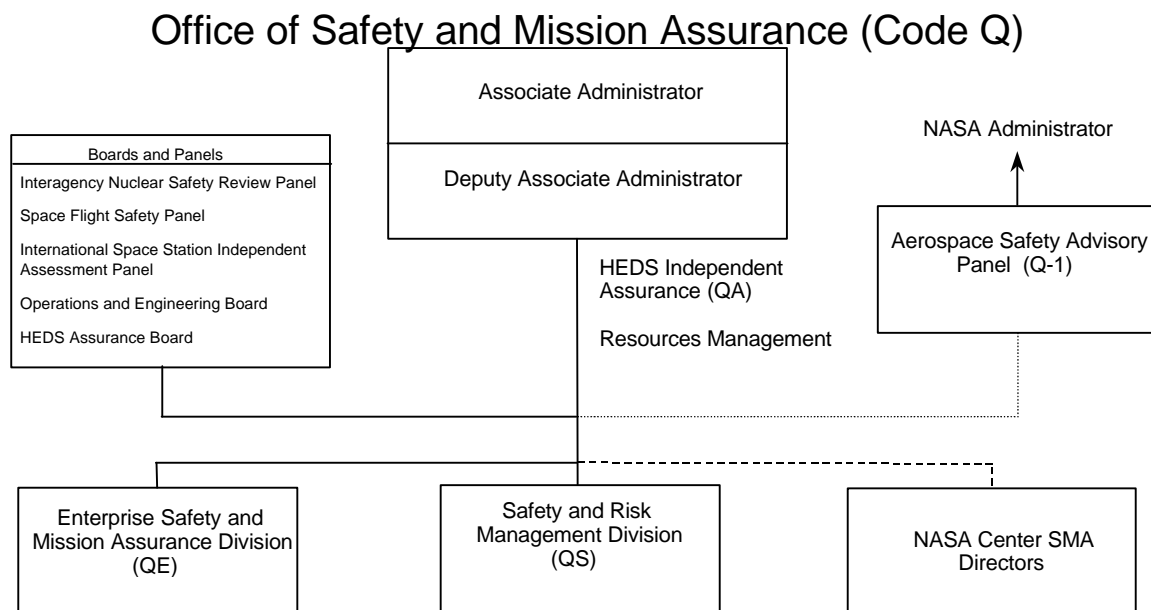


Figure 2-1. – OSMA Organization Chart

OSMA Support to the Enterprises

OSMA has in place, with each Enterprise, an Enterprise SMA Agreement. This agreement specifies the overall approach by which OSMA will implement its responsibility for top-level independent review, oversight, and evaluation of the SMA functions that support the Enterprise. The agreement explains that overall program assurance activity for the Enterprise will focus on the health, capability, and implementation of an effective SMA program that includes the application of SRM&QA and risk management principles and requirements tailored to individual Enterprise programs and projects. For each Enterprise and the Administrator, OSMA provides an independent perspective and assessment of the program activities at both the Center and the Agency level. OSMA uses independent assessments and process verifications to determine whether the Enterprise possesses the effective processes needed to achieve its safety and mission success objectives. The Center SMA organizations provide program/project technical insight and independent assessment support to both the Center Director and program/project managers located at the Center. In addition to the responsibilities detailed in the Enterprise SMA Agreement, OSMA provides the following:

- Policy, guidelines, and standards, and assistance in interpreting and tailoring these documents to meet Enterprise needs.
- Assessment of Center SMA capability and resources.
- Assurance for the proper implementation and application of continuous risk management.

- Tools for safety and reliability risk assessment (fault tree analysis, failure modes and effects analysis, probabilistic risk assessment, and others).
- Training in SMA and safety management system topics.
- Support for mishap investigations.

OSMA Interface with Center SMA Organizations

Each NASA Center has an independent SMA office, which interfaces with OSMA. OSMA works through the Center SMA offices to accomplish much of its mission. OSMA holds quarterly face-to-face meetings with all the Center SMA directors, disseminates information to the Centers on a regular basis, maintains open communications with all Center SMA offices, and provides easy access to Agency SMA information via its website.

The OSMA AOA and PV activity assures that Centers have the proper focus and resources to perform their assurance role. AOA's are Center SMA management plans, focused on customers for SMA products and services. AOA's establish the planning and execution processes to assure available SMA resources are allocated to optimize risk reduction. Each NASA Center SMA office must develop an AOA that spells out, in detail, the SMA products and services that will be provided by the Center SMA office, and what resources will be necessary to provide the products and services. AOA's are considered to be a negotiated agreement among Center SMA customers, other Center organizations responsible for performing the safety compliance functions, the SMA organization, and the Center Director. They are approved and signed by the Center SMA Director, the Center Director, and the Enterprise Associate Administrator, and are concurred on by the Associate Administrator for Safety and Mission Assurance. To ensure the effective application of SMA functions that serve the Enterprises, OSMA conducts a PV to analyze Center SMA functions against the Center AOA. Reports documenting the results of PV reviews at each Center are provided to the appropriate Enterprise Associate Administrator, the Center Director, the Center SMA Director, and the Associate Administrator for Safety and Mission Assurance. These results are also shared with the other Center SMA directors and, when appropriate, other Enterprise Associate Administrators.

Panels and Boards

Several panels and boards advise the Associate Administrator for Safety and Mission Assurance. A brief description of each board is provided below:

- The Interagency Nuclear Safety Review Panel provides an independent evaluation of the radiological risks associated with the launch of a nuclear power system. The Panel members, or coordinators, representing the Department of Defense, Department of Energy, U.S. Environmental Protection Agency, U.S. Nuclear Regulatory Commission, and NASA, are independent of the program under review.

- The Space Flight Safety Panel ensures that safety issues and recommendations are (1) identified and assessed during the development and implementation of NASA space flight programs, and (2) addressed in subsequent technical and management decisions. The Panel independently assesses the NASA space flight safety program, conducts panel (or independent member) reviews of selected issues or concerns, solicits and responds to space flight safety concerns, and provides an independent assessment of safety issues at each Level 1 Flight Readiness Review.
- The International Space Station and Space Shuttle Independent Assessment Panel provides an independent assessment function that encompasses the products and activities of all program participants throughout the entire life cycle of the ISS program and the Space Shuttle program. The Panel, to the maximum extent practicable, provides timely identification of program deficiencies and unacceptable risks, and makes recommendations concerning risk acceptability. The activities of the Panel are complementary to the in-line safety, reliability, and quality assurance activities of the ISS program.
- The HEDS Assurance Board (HAB) provides senior NASA management with timely, objective, non-advocacy assessments of program health and status, and the relative safety posture of the HEDS Enterprise. It is to remain in place only during the HEDS management transition to the Space Flight Operations Contract. The HAB (1) assesses the work processes of the SMA community, (2) reviews HEDS programs to ensure that proper attention is being paid to risk, and (3) reviews the overall effectiveness of the hardware, software, and operational aspects of HEDS programs to assure safety and mission integrity. The HAB places special emphasis on the status and efficiency of the transition of day-to-day management from NASA to the Space Flight Operations Contractor and the surveillance focus from NASA “oversight” to “insight.”
- The NASA Operations and Engineering Board (OEB) supports the Associate Administrator for Safety and Mission Assurance and the Office of Management Systems (Code J) on special assignments related to facilities operations and engineering activities. The OEB evaluates processes and systems for assuring the continuing operational integrity of NASA test facilities, operations and engineering technical support systems, and problems and issues at Centers, and provides recommendations to management in these areas. The OEB also studies technical support system problem areas and develops alternate solutions or methods for arriving at a solution. The OEB is comprised of NASA employees.
- As an independent safety review body, the mission of the Aerospace Safety Advisory Panel (ASAP) is to advise the NASA Administrator and Congress on all safety-related issues--design, development, manufacturing, flight preparation, and missions operations--concerning NASA's human space flight programs. These issues encompass both systems and operational safety. The Panel works closely with the NASA OSMA and SMA organizations and contractors at all levels to achieve its mission.

Part 3: Metrics

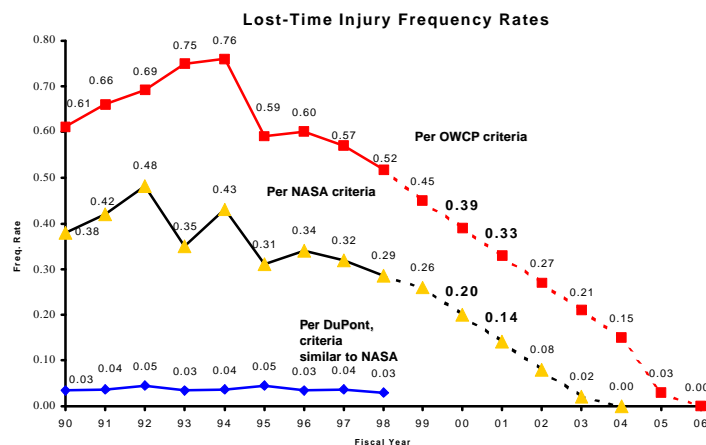
Lost Time Injury Rate²

Objective: NASA will increase the emphasis on the implementation of its safety program and its ultimate goal of becoming the Nation's leader in safety. We will aggressively work to significantly reduce our lost time injury rate. The chart below shows the outcomes that we defined in February 1999 as goals for the next 2 fiscal years. We intend to adjust these each year to drive our mishap rate towards the zero goal.

Indicators: Lost time injury data are collected in NASA's Incident Reporting and Information System (IRIS).

Validation: IRIS data are periodically audited. IRIS data can be compared to the Office of Workers' Compensation Programs (OWCP) case data, which are collected independent of IRIS. OWCP incidents are defined differently than NASA-defined incidents, but the differences are well understood, and OWCP data and NASA-defined incident rates are closely parallel and statistically can be shown to be "in control."

FY 2000/2001 Goals



OWCP data is from Department of Labor, Office of Workers' Compensation Program Reports.

² The lost-time injury rate metric expressed in the 2002 NASA Performance Plan is that NASA will continue to reduce its lost-time injury rate by 5 percent per year from the FY 1994-1996 average. FY 2002's goal is 0.26 lost-time injuries per 200,000 workhours. By meeting the lost-time injury rate metric described in this Functional Leadership Plan, we will exceed the 2002 NASA Performance Plan goal designed to satisfy the Administration's Federal Worker 2000 initiative.

Center Performance Evaluation Profile (PEP)

Assessment of safety and health conditions in the workplace depends on a clear understanding by management and employees of the programs and management systems that an employer uses for safety and health compliance. NASA places a high priority on safety and health programs and wishes to encourage the implementation of those programs by all.

In the past, safety professionals have evaluated the organization's safety and health programs, but those evaluations have not always required complete documentation or been systematically thorough. Unbiased evaluation that is more detailed and better documented can satisfy the Agency's need for program assessment and can accurately gauge the coverage and efficacy of the program. Further, it can be used to provide critical information on areas needing improvement.

In the early 1990's, representatives of the Occupational Safety and Health Administration and field staff developed the fundamental concept of the PEP in a cooperative effort with the National Council of Field Labor Locals (NCFL). NASA took those concepts and expanded them to cover the evaluation of the occupational safety and health program and later, by Administrator request, the system safety management processes. The PEP was instituted in 1999 as a new program assessment instrument and as an adjunct to other tools to be used to perfect the implementation of the Agency Safety Program.

The results from PEP are presented in a format that enables the manager to graphically view information about the effectiveness and degree of implementation of the safety program. The PEP is compatible with other evaluation tools and is not the only such tool that will be used to evaluate the program. It is not a substitute for other program and process evaluations conducted by NASA SMA during process verifications. The PEP for system safety management differs from the general safety PEP in that it focuses specifically on the processes we use to design safety into our programs and projects from the very start. The system safety PEP instrument profiles the attitudes and methods within a program or project that affect how well safety is built into systems. It is primarily used to support program/project managers. It can detect potential management problems or weaknesses, enabling supporting SMA activities to identify specific actions that the program manager could use to avoid future safety risks to the program. This PEP also generates information involving the Agency's overall system safety posture, identifying areas where new policies or Administrator action might be warranted.

The PEP will be used as a source of safety and health program evaluation information for the manager, the employees, and the Administrator and will allow managers to make information-based decisions on allocating resources to improve the safety and health programs.

Part 4: Major Functional Initiatives

A. Agency Safety Program Implementation

"Mission Success Starts with Safety"

Safety plays an integral role in NASA's quest to expand frontiers in aeronautics and space. At the start of the 21st Century, NASA has designated safety and health as one of our principal values. We will not compromise the safety and health of our people and property nor harm the environment. The Agency is working to achieve **zero mishaps** in the NASA workplace, keeping in mind that every employee's safety and health, both on and off the job, is our concern. NASA intends to become the Nation's leader in the safety and occupational health of our work force and the safety of the products and services we provide.

Our strategy is aimed at strengthening NASA's capabilities so that safety permeates every aspect of NASA work, and we routinely incorporate safety and health principles and practices into our daily decisionmaking processes and lives. It is important that management and employees alike are committed to identifying and eliminating hazards in the Agency's workplaces including the unsafe acts or behaviors of workers when performing work tasks. With a change in the culture to one where the precursors to mishap are not tolerated NASA will be able to affect a significant change to its mishap experience – an experience that has remained nearly unchanged over the past decade. With a solid commitment to a defined and well-implemented safety and health program strategy, NASA will establish itself as a national model for safety and health of its workforce and its products.

NASA has established an order that can guide or prioritize Agency safety efforts.

- First, safety of the public. We absolutely must protect the public from any harm that may result from the conduct of the NASA mission.
- Second, safety of astronauts and pilots, because these individuals are exposed to higher levels of potential mishap resulting from hazardous flight regimes.
- Third, safety of our other employees, because NASA performs many operations that are hazardous and it is our obligation to provide our employees with a safe and healthful workplace and the necessary training to recognize and control those hazards.
- Fourth, safety of high value equipment because we are stewards of the public's trust and the loss of some of this equipment would have serious ramifications on the future viability of NASA.

We will achieve our goal through actions that can be categorized into four Core Process Requirements (CPR's). These CPR's are considered to be standard in a world-class safety and health program. The four CPR's are:

- Management commitment and employee involvement.
- System and worksite hazard analysis.
- Hazard prevention and control.
- Safety and health training.

By focusing on the safety of NASA's mission and operations, we will improve quality and decrease cost and schedule.

B. ISO 9000

Program Objectives

On November 13, 1996, the NASA Administrator stated in a letter to Officials-in-Charge of Headquarters Offices, Directors of NASA Field Installations, and the Director of the Jet Propulsion Laboratory (JPL):

"We are leaders in the world of science and technology. We must also be leaders in the world of quality. To this end, I am requiring that the Agency be third-party certified in our key processes, by an internationally recognized registrar, to ISO 9001. This commitment applies to all Centers and Headquarters."

The scope of ISO 9001 registration at each NASA site encompasses the four crosscutting processes contained in the NASA Strategic Plan (NPD 1000.1A) as key processes as well as the implementation of the associated NPD's.

Program Overview

The achievement of ISO 9001 registration internationally demonstrates a commitment to management of quality in an organization's products and processes. In early 1995, NASA began the process of seeking ISO 9001 registration. In December 1995, NASA Management Instruction (NMI) 1270.3, NASA Quality Management System Policy was issued mandating that NASA installations begin the process of incorporating ISO 9001 Quality Management System (QMS) practices. In June 1998, this NMI was replaced with NPD 8730.3, NASA Quality Management System Policy (ISO 9000). Each Center, NASA Headquarters, and JPL is responsible for developing a quality management system plan which identifies the key processes to be certified. Center plans are to be approved by the Center Director. The Headquarters plan is to be approved by the Associate Deputy Administrator, and the JPL plan is to be approved by the Director of JPL.

Program Authority

The NASA Administrator's letter, as quoted above, is interpreted that all NASA Centers, Headquarters, and JPL will become registered to the United States version of the ISO 9001 Standard, ANSI/ASQ Q9001 - 1994. The Associate Administrator for Safety and Mission Assurance is responsible for coordinating ISO 9001 registration across NASA. The Center Directors, the Associate Deputy Administrator, and the Director of JPL, are responsible for achieving registrations for their facilities.

Status

In September 1999, each NASA Center, JPL, and NASA Headquarters achieved the goal of being third-party registered to the ISO 9001 Standard. Currently, all NASA sites are working to maintain their registration and improve implementation of ISO 9001.

Future Activities:

The goal of continuing ISO 9001 registration is to provide a means to continually review and improve the quality of all NASA activities. No end date is envisioned for continuing registration.

- Planned Activity: When the year 2000 update to the ISO 9001 standard is released in late 2000, NASA will begin the process of conversion to the new standard. Conversion is targeted for completion by the end of 2001.
- Planned Activity: OSMA is pursuing a single NASA-wide registrar with the goals of continued registration and identification of cross-Center and NASA-wide areas for continual improvement. This is expected to be possible not earlier than FY 2003.
- Planned Activity: The certification process for ISO 9001 as a management tool for continual improvement within NASA will be used as a benchmark quality process standard for other internationally recognized standardization initiatives being considered such as ISO 14000 (Environmental Management) or the Voluntary Protection Program.